

RESEARCH DEPARTMENT

THE SERVICE AREA OF THE TEMPORARY
TELEVISION TRANSMITTERS AT TRULEIGH HILL,
PONTOP PIKE AND GLENCAIRN

Report No. K-094

(1954/1)

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1. SUMMARY

This report gives the results of a survey of the service areas of the temporary low power transmitters at Truleigh Hill, Pontop Pike and Glencairn.

Tests in the service area of the Glencairn transmitter revealed that echo effects (ghosts) are not serious and are readily eliminated.

Reference is made to the deterioration in the service that may be expected when the Truleigh Hill service is taken over by Rowridge.

2. INTRODUCTION

The plan to provide 85% of the population of the United Kingdom with a television service calls for five high and five medium power transmitters. The five high power transmitters have been in service for some considerable time and in May, 1953, temporary low power transmitters came into service at Truleigh Hill, Pontop Pike, and Glencairn. These three transmitters are intended to provide the Brighton, Newcastle and Belfast areas with a television service until such time as the permanent medium power transmitters come into service. Of the three sites used for the temporary installations only one, Pontop Pike, will be used for the permanent medium power station. The Brighton area will eventually be served by the Rowridge, Isle of Wight, transmitter and Belfast will get its service from a transmitter sited near Divis Hill.

3. GENERAL

Each low power transmitter uses the same channel as that allocated to the permanent transmitter which will eventually replace it and shares it with a high power transmitter. The polarisation of each temporary transmission also corresponds to that which will eventually replace it. The polarisation used at Truleigh Hill is, therefore, vertical while that used at Pontop Pike and Glencairn is horizontal.

For the measurement of the horizontally polarised transmissions, a special single turn loop aerial designed in Research Department was employed. The loop has a loss of 3 dB referred to a half-wave dipole, but is nevertheless sufficiently sensitive for survey purposes. Its most important feature is that it is omnidirectional to within ± 0.5 dB, a factor which greatly expedites the measurement of horizontally polarised transmissions. The loop was mounted on a field strength vehicle 15 ft. above ground level. All field strengths quoted in this report were measured 15 ft. above ground level, but have been corrected, on a linear height-gain basis, to a height of 30 ft.

4. SELECTION OF SITES

4.1. Truleigh Hill

In determining the site for the Brighton area transmitter, two conditions had to be satisfied.

1. The average field strength in the area should be of the same order from this site as from Rowridge.
2. Reception of Alexandra Palace on the site should be interference free and of a quality good enough for re-broadcasting.

After investigating a number of sites on the South Downs, Truleigh Hill was found to be the most suitable.

4.2. Pontop Pike

The temporary transmitter is sited at Pontop Pike, the site for the permanent medium power station. The programme is fed by G.P.O. microwave radio link.

4.3. Glencairn

The site for the permanent station, near Divis Hill, having as yet no access road or services could not be used for the temporary transmitter. A site on Glencairn road, three miles north-west of the centre of Belfast was found. The programme is fed to the transmitter from Kirk o' Shotts via one G.P.O. radio link sited on Black Hill, about one mile south-west of Glencairn. A land line is used between Glencairn and Black Hill.

5. TRANSMISSION DATA

The following table gives details of the channel frequency, power, aerial and mast height of the three stations.

| Station | Channel | E.R.P. (kW) | Mast Ht. (ft.) | Aerial |
|---------------|---------------------|-------------|----------------|-----------------------|
| Truleigh Hill | 3 (Vis. 56.75 Mc/s) | 0.05 - 0.3 | 120 | Dipole and reflector |
| Pontop Pike | 5 (Vis. 66.75 Mc/s) | 1.0 | 238 | 3 stack bat-wing |
| Glencairn | 1 (Vis. 45 Mc/s) | 0.4 | 238 | Single stack bat-wing |

Site details are given in Appendix I.

6. RESULTS

The results of the surveys of Truleigh Hill, Pontop Pike and Glencairn are presented in the form of contour maps in Figures 1, 2 and 3 respectively, and the field

strengths in the large towns are given listed in alphabetical order in Tables I, II and III.

6.1. Truleigh Hill

The average field strength in Brighton and Hove is 0.45 mV/m and 1.7 mV/m respectively. This field strength is adequate for Hove. In Brighton, where there are pockets of field strength of 0.2 mV/m or even less, the average field is low for such a populated area.

Worthing, with an average field strength of 1.0 mV/m has a good service while Shoreham with 2.0 mV/m and Lancing are very well served.

Littlehampton, with 0.3 mV/m , has a fair to poor service, while in Bognor, 0.15 mV/m , the service is poor. On the landward side, Pulborough, Haywards Heath, Burgess Hill, Steyning, etc. all receive a better service than that provided by Alexandra Palace.

Although the field strength in parts of Brighton does not provide a satisfactory service, it is considered inadvisable to increase the power of Truleigh Hill, since the average field strength expected from Rowridge in Brighton is only 0.42 mV/m . Apart from power and proximity considerations it was, of course, inevitable that in such hilly country many urban and rural areas within, say, 7-10 miles of Truleigh Hill would receive a stronger signal from the temporary station than may be expected from Rowridge, simply on account of the entirely different land profile between the areas concerned and the transmitting sites.

Complaints of poorer reception, must, therefore, be expected from many localities when the change over from Truleigh Hill to Rowridge is made. This situation will, however, be eliminated or largely alleviated when the Crystal Palace transmitter comes into service for many localities in the "shadow" from Rowridge will be "illuminated" by Crystal Palace. Thus, in adjoining areas, Crystal Palace may provide the best service in one while Rowridge serves the other. In general, however, the dividing line between the service areas will be the South Downs.

6.2. Pontop Pike

Figure 2 shows that while Newcastle, 2 mV/m , gets a reasonably good service from the temporary installation, the field strength in the highly populated area near the Tyne estuary (0.2 mV/m) is inadequate for a fully satisfactory television service. Hartlepool, Middlesborough, Stockton and Darlington with mean field strengths of 0.1 to 0.2 mV/m are also poorly served from the temporary transmitter. All these areas will, however, have an improved service when the permanent transmitter comes into service. In the meantime, the temporary installation provides Newcastle, Gateshead and Durham and all rural areas within 16-25 miles with a reasonably good television service.

6.3. Glencairn

The service area of the Glencairn transmitter (Figure 3) is about half that of either Truleigh Hill or Pontop Pike, being restricted by a mountain range running from Lisburn in the south-west to Whitehead in the north-east. The site being only

three miles from the centre of Belfast, the city is provided with an excellent service, the field strength ranging from 5 to > 100 mV/m. Bangor gets a poor service, the mean field strength being only 0.18 mV/m. Lisburn and Hillsborough both receive only 0.3 mV/m, but may expect about 3 mV/m when the permanent transmitter goes into service. Larne receives only about 20 μ V/m, the signal being attenuated by the mountain barrier mentioned earlier, but when the permanent transmitter near the top of Divis Hill comes into service, a very considerable improvement may be expected. Although it was considered that multipath ghost effects might result from reflection on the mountains immediately behind Glencairn, careful observations in a number of districts in Belfast revealed only very slight trouble, which could readily be eliminated by suitably re-orienting the receiving aerial. In general, the worst receiving sites for ghosts were those near the docks where the cranes were found to act as reflectors.

7. CONCLUSIONS

The three temporary stations provide a service for parts of highly populated areas which would otherwise have no service of any kind.

When the permanent transmitters come into service, Rowridge will make by far the biggest contribution to improving the existing temporary service (except in the Brighton area), bringing in the areas of Bournemouth, Southampton, Winchester and Portsmouth which at present receive no service. Pontop Pike and Divis Hill will both enlarge their service areas and Pontop Pike in particular will provide a first-class service in highly populated areas which are at present receiving a poor service from the temporary installation.

APPENDIX I

Site Data

TRULEIGH HILL

Latitude $50^{\circ} 52' 54''$ N
 Longitude $00^{\circ} 15' 22''$ W
 Grid ref: 51/227106

Height above mean sea level = 700 ft.
 Mast height = 120 ft.

PONTOP PIKE

Latitude $54^{\circ} 52' 06''$ N
 Longitude $01^{\circ} 46' 11''$ W
 Grid ref: 45/148527

Height above mean sea level = 1000 ft.
 Mast height = 238 ft.

GLENCAIRN

Latitude $54^{\circ} 36' 46''$ N
 Longitude $05^{\circ} 59' 06''$ W

Height above mean sea level = 400 ft.
 Mast height = 238 ft.

TABLE I

TRULEIGH HILL

| Town | Field Strength (mV/m 30° a.g.l.) | | |
|----------------|-------------------------------------|------|------|
| | Max. | Mean | Min. |
| Arundel | 0.4 | 0.18 | 0.07 |
| Bognor | 0.2 | 0.14 | 0.08 |
| Brighton | 4.0 | 0.45 | 0.07 |
| Burgess Hill | 4.6 | 1.7 | 0.14 |
| Crowborough | 0.6 | 0.2 | 0.04 |
| East Grinstead | 0.24 | 0.1 | 0.03 |
| Haslemere | 0.3 | 0.12 | 0.02 |
| Haywards Heath | 1.2 | 0.6 | 0.1 |
| Horsham | 0.16 | 0.1 | 0.06 |
| Hove | 6.6 | 1.7 | 0.6 |
| Lancing | 3.0 | 2.0 | 0.4 |
| Lewes | 0.06 < 0.02 < 0.02 | | |
| Littlehampton | 0.4 | 0.28 | 0.08 |
| Midhurst | 0.14 | 0.1 | 0.02 |
| Newhaven | 0.5 | 0.17 | 0.06 |
| Pulborough | 1.0 | 0.6 | 0.2 |
| Seaford | 0.16 | 0.14 | 0.06 |
| Shoreham | 6.0 | 3.5 | 1.7 |
| Steyning | 5.5 | 3.5 | 1.2 |
| Worthing | 2.0 | 1.0 | 0.3 |

TABLE II

PONTOP PIKE

| Town | Field Strength (mV/m 30° a.g.l.) | | |
|-------------------|-------------------------------------|------|--------|
| | Max. | Mean | Min. |
| Alnwick | 0.1 | 0.04 | < 0.01 |
| Bishop Auckland | 0.58 | 0.33 | 0.13 |
| Blyth | 0.32 | 0.2 | 0.08 |
| Chester le Street | 2.0 | 0.82 | 0.3 |
| Corbridge | 4.9 | 2.4 | 1.0 |
| Darlington | 0.28 | 0.1 | 0.04 |
| Durham | 2.5 | 0.57 | 0.1 |
| Gateshead | 1.9 | 1.3 | 0.08 |
| Haltwhistle | 0.24 | 0.1 | 0.05 |
| Hartlepool | 0.3 | 0.16 | 0.06 |
| Haydon Bridge | - | 0.1 | - |
| Hebburn | - | 0.57 | - |
| Jarrow | 0.41 | 0.26 | 0.24 |
| Middlesborough | 0.36 | 0.16 | 0.05 |
| Monkton | - | 0.36 | - |
| Newcastle | 13.5 | 2.4 | 0.3 |
| Northallerton | 0.1 | 0.05 | < 0.01 |
| North Shields | - | 0.36 | - |
| Redcar | 0.37 | 0.21 | 0.07 |
| Saltburn | 0.37 | 0.18 | 0.05 |
| South Shields | 1.5 | 0.36 | 0.26 |
| Sunderland | 6.5 | 0.81 | 0.12 |
| Stockton-on-Tees | 0.3 | 0.13 | 0.06 |
| Tynemouth | 0.24 | 0.16 | 0.12 |
| Wallsend | 0.81 | 0.57 | 0.1 |
| West Hartlepool | 0.21 | 0.1 | 0.03 |
| Whitley Bay | - | 0.2 | - |

TABLE III

GLENCAIRN

| Town | Field Strength (mV/m 30° a.g.l.) | | |
|---------------|----------------------------------|---------|---------|
| | Max. | Mean | Min. |
| Antrim | 0° 04 | 0° 035 | < 0° 03 |
| Bangor | 0° 63 | 0° 185 | 0° 085 |
| Ballymena | - | < 0° 03 | - |
| Belfast | 100 | 18 | 1° 8 |
| Carrickfergus | 1° 27 | 0° 9 | 0° 64 |
| Comber | - | 0° 14 | - |
| Donaghadee | - | 0° 04 | - |
| Downpatrick | 0° 086 | 0° 06 | < 0° 03 |
| Hillsborough | 0° 55 | 0° 3 | 0° 14 |
| Holywood | 7° 1 | 4° 3 | 1° 7 |
| Larne | - | 0° 04 | - |
| Lisburn | 0° 59 | 0° 3 | 0° 18 |
| Newtownards | 0° 38 | 0° 2 | 0° 056 |
| Randalstown | - | 0° 03 | - |
| Saintfield | - | 0° 2 | - |
| Whitehead | 0° 23 | 0° 16 | 0° 045 |

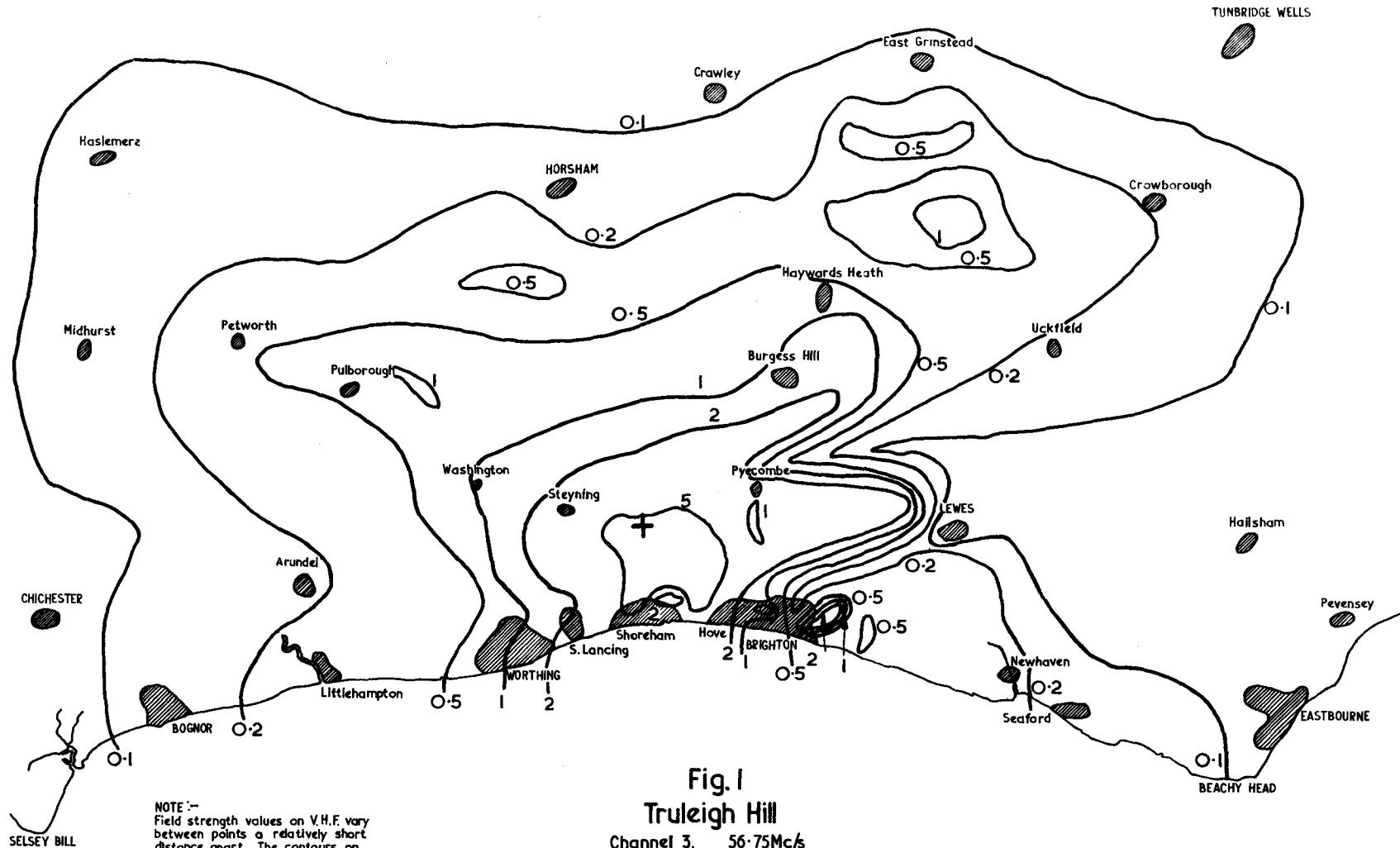


Fig. I
Truleigh Hill

Channel 3. 56.75 Mc/s

Polarisation - Vertical

Mean E.R.P. = 0.05-0.30 kW

Site height = 700 ft

Mast height = 120 ft

NOTE:-
Field strength values on V.H.F. vary between points a relatively short distance apart. The contours on this map are based on a field strength survey, and represent the average field strength in the areas concerned. The field strength actually available at any particular location may differ by ± 10 db from the value shown, the probable degree of error being greatest in hilly or built up areas.

SCALE OF MILES
5 0 5 10

SCALE OF KILOMETRES
5 0 5 10 15

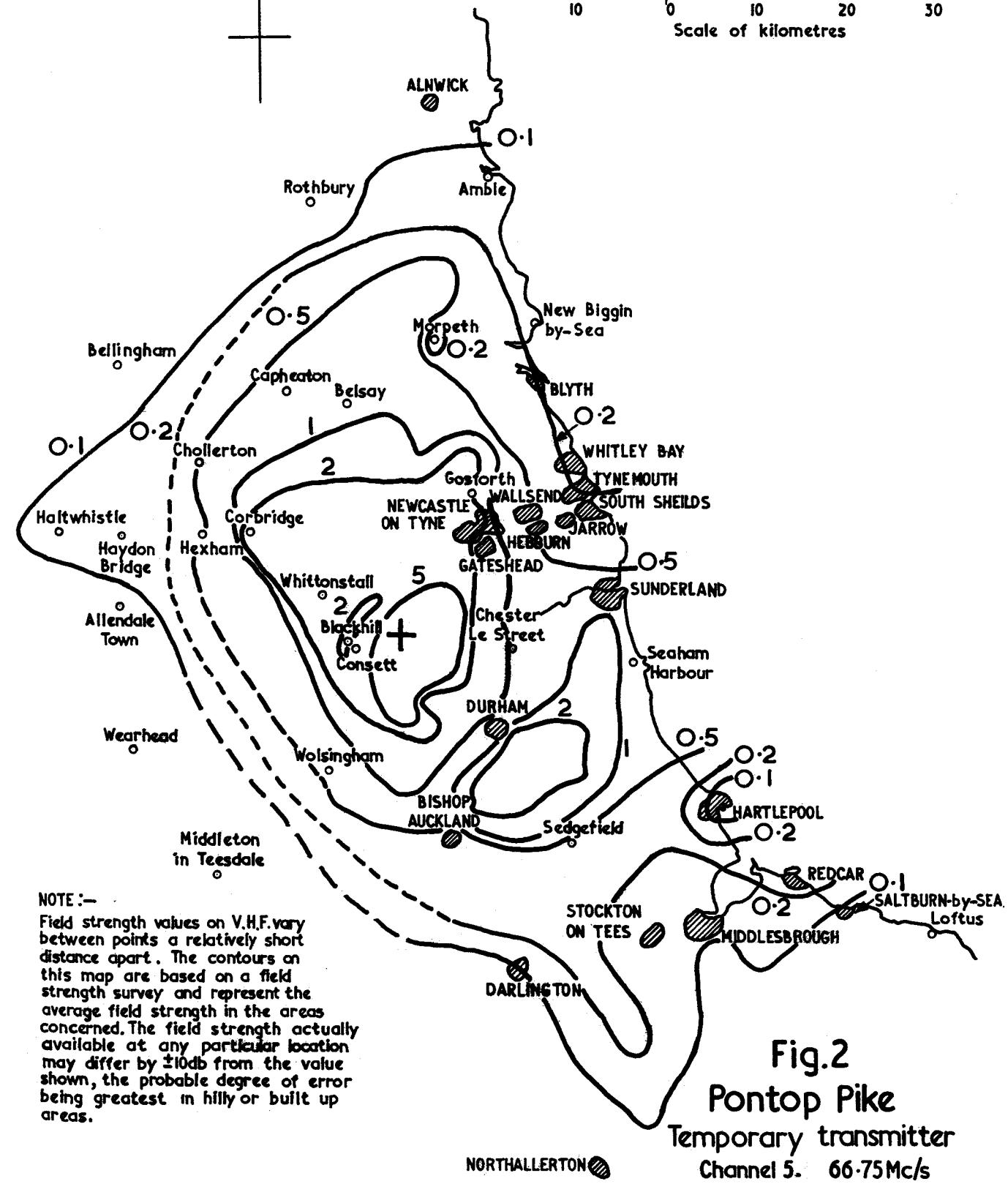
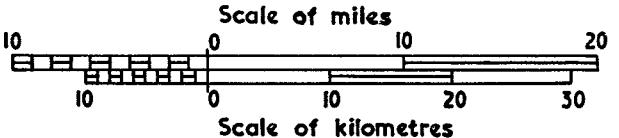
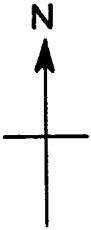


Fig.2
Pontop Pike
Temporary transmitter
Channel 5. 66.75 Mc/s
Polarisation—Horizontal
Mean E.R.P. = 1 kW.

Site Height = 1000ft. Mast Height = 238ft

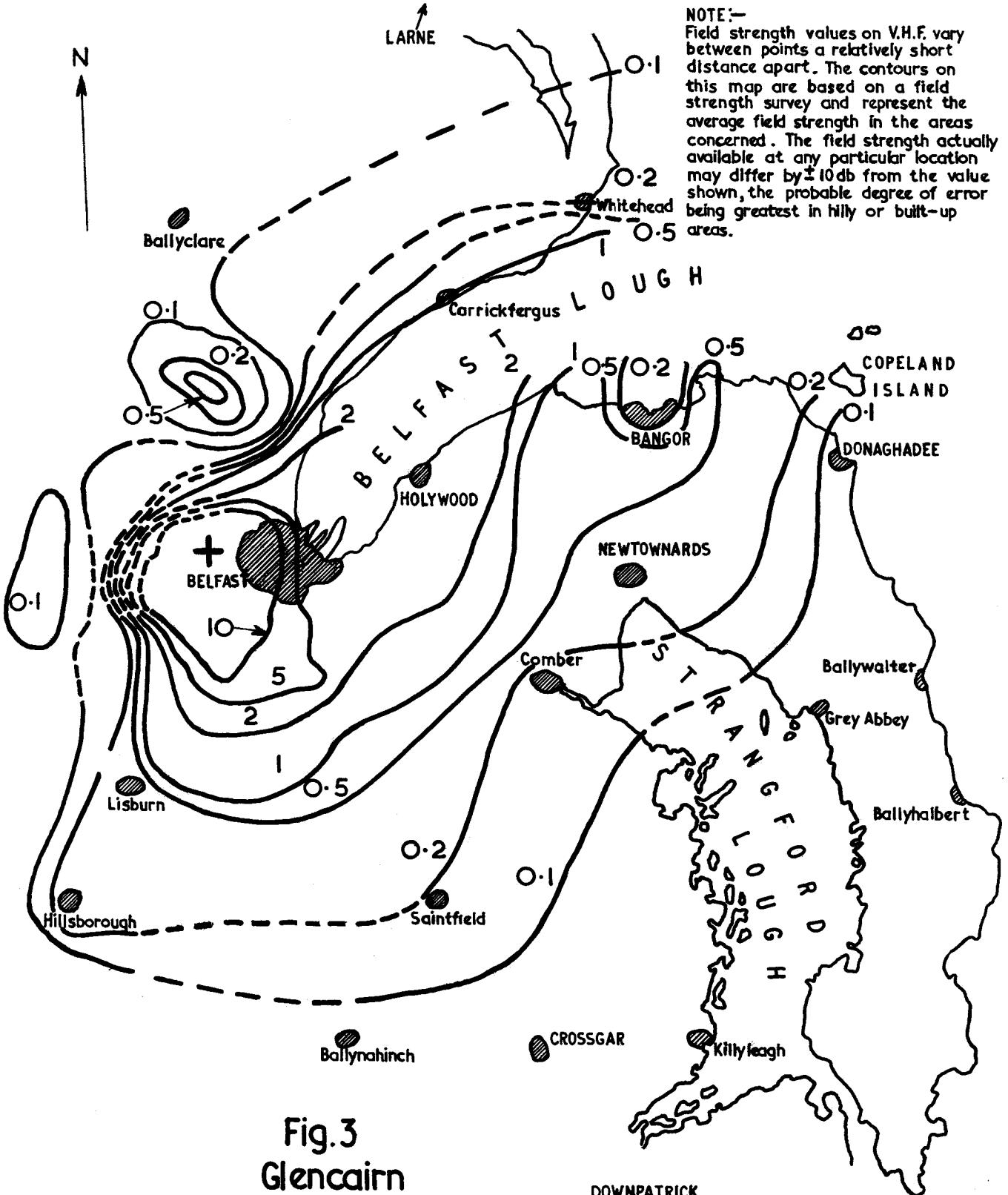


Fig.3
Glencairn

Channel 1. 45 Mc/s
 Polarisation - Horizontal

Mean E.R.P. = 0.4 kW

Site Height = 400 ft

Mast Height = 238 ft